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60,130-1899; 03MRA0388

UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Kramer
Serial No.:	10/715,051
Filed:	11/17/2003
Examiner:	Burch, Melody M.
Art Unit:	3683
Title:	Force Sensor For Vehicle Brake Application

M/S AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Dear Sir:

Appellant submits this Appeal Brief subsequent to the filing of its Notice of Appeal on April 6, 2006. Fees in the amount of $500.00 may be charged to Deposit Account No. 50-1482 in the name of Carlson, Gaskey & Olds. If additional fees are necessary, you are authorized to charge those fees to the above-referenced deposit account.

Real Party in Interest

The real party in interest in this application is the assignee, ArvinMeritor Technology, LLC.

Related Appeals and Interferences

There are no prior or pending appeals, interferences or judicial proceedings relating to this appeal, or which may directly effect or be directly effected by, or have a bearing on, the Board's decision in this appeal.

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Status of Claims

Claims 1-3, 7-14 and 21 stand finally rejected, and are appealed. Claims 4-6 and 15-20 have been identified as containing patentable subject matter.

Status of Amendments

In response to the final rejection, applicant is concurrently submitting Replacement Drawings to address the examiner's rejection. It is assumed these drawings will be entered.

Summary of Claimed Subject Matter

The present invention relates to a unique location for a force sensor in a disc brake system. A disc brake as shown in Figure 1 includes a lever 40 that is actuated from a remote location by a brake actuator to actuate brake pads 24 and 26 into rotor 22. When the lever 40 is turned, pistons 34 drive the pads. See paragraph 17.

To adjust for wear on the brake pads, tappets 28 and 29 drive the position of pistons 34. Thus, an adjustment mechanism is incorporated into the system. An electric motor 30 drives a gear 32 to rotate the tappets 28 and 29. These are internally threaded in the pistons 34, and when the tappets 28 and 29 are driven to rotate, they move the pistons 34 downwardly to adjust for clearance (paragraphs 18 and 19).

With electric motor arrangement, it becomes necessary to know how much adjustment may be desirable. Thus, a sensor 46 is incorporated into the system, and can sense when braking begins. This is fed back to the motor 30 through a control 31 such that the motor 30 can drive the tappets 28 and 29 the appropriate amount to adjust for clearance (paragraphs 22 and 23).

In the prior art, sensors are incorporated, however they have typically been incorporated along the path of transmission. The present invention places the force sensor 46 such that it receives a reaction force, and thus need not be packaged along the force transmission path. In the exact location shown in Figure 1, the force sensor 46 is positioned to receive the reaction force through a bearing 44.

Independent claims 1 and 10 stand finally rejected.

Independent claim 1 requires there be an actuation mechanism (lever 40) that is movable to apply a braking force. A pair of pistons (34) are movable to force a brake pad

(24, 26) into contact with an item to be braked (22). An adjustment mechanism adjusts a location of the pair of pistons to take up clearance. A force sensor (46) senses a **reaction** force to said braking force, and identifying a point of force application increase indicative of initial contact of said brake pad with the item to be braked. The force sensor sends a signal to an electric control (31) for the adjustment mechanism.

Claim 3 requires that the force sensor is located to receive the reaction force from the eccentric shaft.

Independent claim 10 is similar to independent claim 1, however, this claim specifically recites that the force sensor is an electric sensor which receives a current, and has a resistance that varies with the reaction force applied to the force sensor.

Dependent claim 14 is dependent to claim 10 and includes limitations similar to those found in claim 3.

Grounds of Rejection to be Reviewed on Appeal

A. The 35 U.S.C. §112, Second paragraph Rejection of Claim 21 is Appealed.

B. The 35 U.S.C. §102 Rejection of Claims 1 and 21 Over U.S. Patent 4,784,244 to Carre, et al. is Appealed.

C. The 35 U.S.C. §103 Rejection of Claims 1-3 and 7-14 Over U.S. Patent 6,397,977 to Ward Taken with Carre, et al. is Also Appealed.

D. The B and C Rejections are Also Further Combined with the U.S. patent 6,272,936 to Oreper, et al. These rejections are also appealed.

Arguments

The 35 U.S.C. §112 Rejection.

The examiner argues that claim 21 is indefinite. The examiner argues that since a "braking force" is recited in parent claim 1, the recitation of "a braking force" in line 4 of claim 21 is indefinite.

Indefiniteness requires a claim to not be understandable. A reader of claim 21, being of ordinary skill in the art, would recognize that what is being referred to in claim 21 is a particular braking force, how a particular braking force is sensed and how the sensor signal is utilized in response to that particular braking force. Claim 1 is referring more to the

arrangement of the various components. A worker of ordinary skill in the art would recognize this, and would be able to understand the claim.

The examiner also argues that the "clearance" two lines from the bottom and "gap" three lines from the bottom, are also confusing. Again, a worker of ordinary skill in the art would recognize what these limitations mean. The gap is between components of the disc brake. The clearance is the amount of adjustment needed by the adjustment mechanism. Obviously, the amount of adjustment of the motor 30, for instance, to take up any gap between the discs and pistons 34 for example, would be different. A worker of ordinary skill in the art would recognize what is being recited in claim 21, and would recognize the above.

Finally, the examiner argues that the limitation "components of the disc brake" is indefinite in that it is unclear whether the "components" are some that have been previously recited, or whether they are different. However, the examiner's question does not point to anything indefinite in the claim. Rather, the claim is simply broad in this regard.

Nevertheless, should this claim otherwise be allowable, appellant would be willing to amend claim 21 in view of the examiner's comments. However, the claim is definite as written, and reversal of this rejection is in order.

The 35 U.S.C. §102 Rejections Over Carre, et al.

Claims 1 and 24 require that there be a "force sensor for sensing a reaction force" to a braking force "and identifying a point of force application increase indicative of initial contact of said brake pad with the item to be braked." The claim further requires that the force sensor send a signal to an electric control for the adjustment mechanism.

The examiner rejects claim 1 as being anticipated by Carre, et al.

With regard to claim 1, the examiner points to the force sensor 23 of Carre, et al. While this sensor does appear to receive a reaction force, it would seem that this has to do with the amount of movement downwardly along the ramp surface 16. There is nothing within Carre, et al. that speaks of utilizing the output signal of the force sensor 23 as feedback to an adjustment mechanism. Carre, et al. does discuss an adjustment mechanism, but in fact does not tie this adjustment mechanism (paragraph beginning at line 28, col. 3) with the prior paragraph that discusses the pressure sensor 23. Simply, nothing in Carre, et al. indicates the pressure sensor 23 is utilized with the adjustment mechanism.

Notably, this failure of Carre, et al. to meet the claims applies across all rejections.

The Rejection Under 35 U.S.C. §102 of Claim 21 is Separately Contested.

This claim requires that the point of force application is associated with a rotational position of a portion of the actuation mechanism. This rotational position is utilized after application of a braking force to identify a gap between components, and in turn identify a clearance to be adjusted by the adjustment mechanism. None of this is disclosed by Carre, et al. Simply, for the examiner to reject this claim as having been anticipated is unsupported.

Rejections Under 35 U.S.C. §103.

Claim 10 is rejected over Carre, et al. taken with Oreper, et al.

As mentioned above, Carre, et al. does not disclose a sensor that would meet the functional limitations of what the sensor senses, or how any sensor signal is utilized. This claim is allowable for the reasons identical to those mentioned above with regard to claim 1.

Oreper, et al. may disclose a sensor type that meets some of the broader descriptions of what the sensor is, however no reference discloses what the claimed sensor does. Simply, these claims are allowable.

The 35 U.S.C. §103 Rejections Over Ward Taken With Carre, et al.

Ward discloses a brake that is closer to the brake disclosed in appellant's patent. However, Ward does not disclose a force sensor that receives a reaction force.

Carre, et al. is deficient as mentioned above, and thus, even if it were properly modified by Ward, it would still not meet the claims.

The Rejection of Claims 3 and 14 is Separately Contested.

The examiner argues that Carre, et al. discloses its sensor 23 positioned to receive a reaction force from an eccentric shaft, and thus argues that the claimed location would have been an obvious modification to the Ward reference. Nothing within Carre, et al. would suggest the particular application of the sensor into the Ward patent such that it would receive a reaction force from the eccentric shaft 14. Simply, the two brake mechanisms are too distinct, and nothing would suggest a particular location.

The only source for suggesting the claimed location is appellant's disclosure, and the examiner's proposed rejection is mere hindsight.

Conclusion

For the reasons set forth above, the rejection of all claims is improper and allowance of all claims is in order.

Respectfully submitted,

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Dated: June 6, 2006

CERTIFICATE OF MAIL

I hereby certify that the enclosed Response is being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 6 day of June, 2006.

Laura Combs

CLAIMS APPENDIX

1. A disc brake comprising:

an actuation mechanism being movable to apply a braking force;

a pair of pistons movable upon receipt of said braking force to force a brake pad into contact with an item to be braked;

an adjustment mechanism for adjusting a location of said pair of pistons to take up clearance with wear in said brake pad; and

a force sensor for sensing a reaction force to said braking force, and identifying a point of force application increase indicative of initial contact of said brake pad with the item to be braked, said force sensor sending a signal to an electric control for said adjustment mechanism.

2. The disc brake as set forth in claim 1, wherein said actuation mechanism includes an eccentric shaft, said eccentric shaft driving at least one bearing to in turn force said pair of pistons and said brake pad toward the item to be braked.

3. The disc brake as set forth in claim 2, wherein said force sensor is located to receive said reaction force from said eccentric shaft and said eccentric shaft applies said reaction force to said at least one bearing.

4. The disc brake as set forth in claim 3, wherein a bearing cup supports said at least one bearing and said eccentric shaft, said force sensor being placed on an opposed side of said bearing cup from a surface that supports said at least one bearing and said eccentric shaft.

5. The disc brake as set forth in claim 4, wherein said force sensor and said bearing cup are received in a cavity in a housing for said disc brake.

6. The disc brake as set forth in claim 4, wherein said force sensor has an outer cover, and a thin anvil member placed between said outer cover and said force sensor, said thin anvil member transmitting said reaction force from said outer cover to said force sensor, and said thin anvil member being operable to limit a total force applied to said force sensor.

7. The disc brake as set forth in claim 1, wherein said force sensor is an electric sensor receiving a current and having a resistance that varies with said reaction force applied to said force sensor.

8. The disc brake as set forth in claim 7, wherein said force sensor includes a protective cover between a member which applies said reaction force and an electric portion of said force sensor which receives said current.

9. The disc brake as set forth in claim 8, wherein a thin anvil member is placed between said protective cover and said electric portion, said thin anvil member transmitting force from said protective cover to said electric portion, and said thin anvil member limiting an amount of total force applied to said electric portion.

10. A disc brake comprising:

an actuation mechanism being movable to apply a braking force;

a pair of pistons movable upon receipt of said braking force to force a brake pad into contact with an item to be braked;

an adjustment mechanism for adjusting a location of said pair of pistons to take up clearance with wear in said brake pad; and

a force sensor for sensing a point of force application increase indicative of initial contact of said brake pad with the item to be braked, said force sensor sending a signal to an electric control for said adjustment mechanism, said force sensor being an electric sensor receiving a current and having a resistance that varies with a reaction force applied to said force sensor.

11. The disc brake as set forth in claim 10, wherein said force sensor includes a protective cover between a member which applies said reaction force to said force sensor and an electric portion of said force sensor which receives said current.

12. The disc brake as set forth in claim 11, wherein a thin anvil member is placed between said protective cover and said electric portion, said thin anvil member transmitting force from said protective cover to said electric portion, and said thin anvil member limiting an amount of total force applied to said electric portion.

13. The disc brake as set forth in claim 12, wherein said actuation mechanism includes an eccentric shaft, said eccentric shaft driving at least one bearing to in turn force said pair of pistons and said brake pad toward the item to be braked.

14. The disc brake as set forth in claim 13, wherein said force sensor is located to receive said reaction force from said eccentric shaft and said eccentric shaft applies said reaction force to said at least one bearing.

15. The disc brake as set forth in claim 14, wherein a bearing cup supports said at least one bearing and said eccentric shaft, said force sensor being placed on an opposed side of said bearing cup from a surface that supports said at least one bearing and said eccentric shaft.

16. The disc brake as set forth in claim 15, wherein said force sensor and said bearing cup are received in a cavity in a housing for said disc brake.

17. The disc brake as set forth in claim 16 wherein said thin anvil member is a compliant member whose deformation is limited by the cavity.

18. A disc brake comprising:

an actuation mechanism being movable to apply a braking force;

a pair of pistons movable upon receipt of said braking force to force a brake pad into contact with an item to be braked, said actuation mechanism including an eccentric shaft, said eccentric shaft driving at least one bearing to in turn force said pair of pistons and said brake pad toward the item to be braked, a bearing cup supporting said at least one bearing and said eccentric shaft, said bearing cup received in a cavity in a housing for said disc brake;

an adjustment mechanism for adjusting a location of said pair of pistons to take up clearance with wear in said brake pad; and

a force sensor for sensing a point of force application increase indicative of initial contact of said brake pad with the item to be braked, said force sensor sending a signal to an electric control for said adjustment mechanism, said force sensor being positioned between said bearing cup and said cavity, said force sensor being an electric sensor receiving a current and having a resistance that varies with a reaction force applied to said force sensor.

19. The disc brake as set forth in claim 18, wherein said force sensor includes a protective cover between said bearing cup and an electric portion of said electric sensor which receives said current.

20. The disc brake as set forth in claim 19, wherein a thin anvil member is placed between said protective cover and said electric portion, said thin anvil member transmitting force from said protective cover to said electric portion, and said thin anvil member limiting an amount of total force applied to said electric portion.

21. The disc brake as set forth in claim 1, wherein said signal is utilized to identify the point of force application, and the point of force application is associated with a rotational position of a portion of the actuation mechanism, the rotational position being utilized after application of a braking force to identify a gap between components of the disc brake, to in turn identify a clearance that is adjusted by said adjustment mechanism after the application of the braking force.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.